



Tropentag, September 14-16, 2010, Zurich

“World Food System —
A Contribution from Europe”

Chitosan Can Reduce Harmful Effects of Water Stress on Safflower(*carthamus Tinctorius* L.)

BATOOL MAHDAVI¹, SEYED ALI MOHAMMAD MODARRES-SANAVY², MAJID AGHAALIKHANI³,
MOZAFAR SHARIFI⁴

¹ Tarbiat Modares University, Agronomy Department, Iran

² Tarbiat Modares University, Agronomy, Iran

³ Tarbiat Modares University, Agronomy, Iran

⁴ Tarbiat Modares University, Plant Science Department, Iran

Abstract

The main aim of this research was to determine influence of chitosan on morphological and physiological characteristics of safflower (*Carthamus tinctorius* L.) under water deficit stress conditions. For this purpose, a pot experiment was conducted with three factors including chitosan concentrations (0, 0.05, 0.1 %, all dissolved in 1 % acetic acid) along with an additional treatment of distilled water, foliar application timings (before and during stem elongation) and water deficit levels (unstressed control and withholding irrigation until 40 % available water). This experimental design was randomised complete block arrangement in 4*2*2 factorial with three replications. Results revealed that water deficit significantly decreased plant height, leaf area, shoot and root dry weight, maximum quantum yield of photosystem II (Fv/Fm) and Fm whereas increased malondialdehyde (MDA) and proline content. The greatest leaf area and root dry weight obtained at 0.05 % chitosan treatment. The highest of shoot dry weight, Fv/Fm and proline content in leaves were observed after chitosan application at concentration 0.1 %. MDA content was decreased by 0.05 and 0.1 % chitosan application (26.9 and 17.9 % less than distilled water treatment, respectively). Spraying with 0.1 % chitosan before stem elongation seems to increase leaf area, Fv/Fm and Fm under water deficit stress conditions. Conversely, MDA content of safflower leaves at 0.05 chitosan application before stem elongation was 35.3 % less than distilled water treatments. In this condition, the lowest proline content of safflower leaves obtained at 0.1 % chitosan treatment. In stressed plants, the application of 0.05 and 0.1 % chitosan during stem elongation resulted in lower MDA and proline content than in the distilled water and acid acetic (0 % chitosan) treatments. It seems that chitosan application helps the plants for better resistance under the stress by inactivation and scavenging of free radicals. The results of the present study indicated that this biostimulator may reduce the harmful effects of water stress.

Keywords: Chitosan, Fv/Fm, MDA, proline, Safflower, water deficit stress